

MEDSIMM® - A QuickTime®-based Hypermedia Software System For Generating Realistic Pediatric Emergency Clinical Simulations

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In pediatric emergency medicine, where there is limited exposure to critically ill patients, there is a need to expand the problem-based training capabilities for medical personnel in terms of access to realistic case simulations. Particularly important is the need to expose the clinically inexperienced student to routine emergency cases requiring time-critical powers of observation and decision-making. A number of microcomputer-based hypermedia clinical simulations have been created to address this need on a case-by-case basis; however, an integrated system for the fast, continuous generation of sophisticated, interactive simulations by medical professionals using artificial or real-time video/sound/monitoring values still remains to be implemented.

The recreation of perceptually realistic and time-critical clinical environments demanding multiple, interdependent overlapping decisions and procedural functions within critical time periods with variable consequences is a critical factor in the development of clinical simulator.

MEDSIMM, designed to fulfill the above requirements, initially uses at its core, an object-oriented temporal knowledgebase using SuperCard 2.0 and the Macintosh QuickTime software architecture having two basic functions: authoring and presentation.

The Authoring Function allows the domain expert three capabilities:

- 1) guiding the creation of a case "segment" hypermedia library relevant to the desired clinical experience, usually video, sound, patient monitoring data and event flags.
- 2) case integration of segments into a complete, ordered segment "network" representing alternative pathways capable of being navigated by the student.
- 3) preliminary testing of all possible simulation pathways

The Presentation Function allows the student users two capabilities:

- 1) the realistic, hypermedia experience of saving the patient against the clock in a representative "virtual" clinical environment
- 2) complete "instant replay" evaluation of the entire case showing the student's responses against the best response(s) that could have been made in the opinion of the authors.

Thus, authoring a MEDSIMM case involves using the authoring application to build the case segment library and network, set evaluation timing/decision weights, random error parameters and medical team composition and save it as a student-ready simulation.

Running a MEDSIMM case simulation consists of the student executing the simulation viewer and responding to its visual and verbal prompting as ordered by each running hypermedia segment. The intervention choices and timing decisions (or lack thereof) by the student determines the succeeding patient state (ie: the next segment) until patient stabilization or death occurs. MEDSIMM then displays a case profile summarizing the student's performance. The student may review the entire sequence of segments as they occurred showing all decisions when they occurred and their consequences including the correct decisions if necessary.

Ultimately, MEDSIMM is designed to evolve in two ways:

- 1) Future C/C++ and SmallTalk versions will increase the sophistication of evaluation functions and QuickTime track-based media.
- 2) virtual reality: the incorporation of visually / audibly immersive methods allowing 360 degree views of the Emergency Department bay, patient and resuscitation team.
- 3) real time case media capture: the incorporation of real time video/sound/patient monitoring parameters and the guided translation of this media into the MEDSIMM case structure.